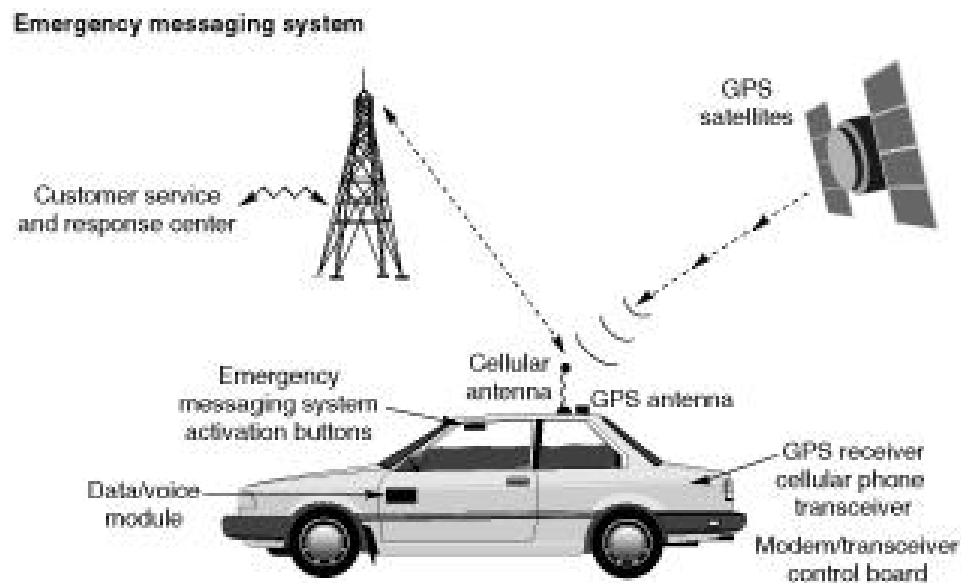


3 - transportation technology

3-1 Intelligent Transportation Systems:

- Intelligent Transportation Systems or ITS are scientific and engineering advances in communications, computer and information systems that are applied to surface transportation. Its applications include real-time traffic information delivered on the Internet, road-weather information, ramp meters, computer-aided dispatch systems for transit vehicles, highway advisory radio and variable message signs. Many of these products and services are already in operation in the Puget Sound region as on-going traffic engineering measures.
- The rationale behind ITS is to limit construction, environmental and property rights damage caused by expanding highways and make more efficient use of existing highways and space limitations.



- Automobiles may also develop into more sophisticated communications and information centers for drivers and passengers. Communications and information should be available instantaneously and regardless of location. This collection and transmission of transportation system conditions should help travelers change their trips to minimize inconvenience and redistribute the “strain” on the system.
- ITS is also helping vehicles become safer. Applications of ITS include collision avoidance, automated corrective steering, braking and traction systems, intelligent cruise control systems, intelligent crash systems (air bags, roll bars, etc.). Another development is the use of automobile “black boxes” (like on airplanes) that provide vehicle and driver performance information which may impact accident investigation and liability related to accidents.
- Current programs: Smart TREK uses information technology to better manage the region's traffic, inform travelers, move public transit more efficiently and improve emergency response.
- Nationwide, a projected \$209 billion will be invested in ITS between now and the year 2011 with a full 80% of that investment coming from the private sector in the form of consumer products and services.

3-2 Hybrid Vehicles:

- A Hybrid Electric Vehicle (HEV) is an electric car that also has a small internal-combustion engine and an electric generator on board to charge the batteries, thereby extending the vehicle's range.
- The power of a hybrid's internal combustion engine generally ranges from one tenth to one quarter that of a conventional automobile's, and can be made almost as “clean” as a pure electric.
- When pollution from the generating sources that charge its batteries is taken into account, an electric vehicle discharges about one tenth the pollution of a conventional car with a well-tuned engine. An HEV, in comparison, can be about one eighth as polluting.
- Two types of HEVs are designated: series and parallel. In the series type, a gasoline engine drives a generator that charges the batteries that power the electric motor, which turns the wheels. Only this motor can turn the wheels. In the parallel scheme, the gasoline engine or the electric motor (or both) can turn the wheels.

A series hybrid is generally more efficient but less powerful than a parallel HEV. So if the car is to be used for a daily commute of 35 kilometers or less each way, and perhaps the longer trip every now and then, a series HEV may be called for. On the other hand, if the vehicle is to function (and feel) more like a conventional, gasoline-powered car, then a parallel hybrid may be necessary. These are illustrated on the next two pages.

Image of series configuration

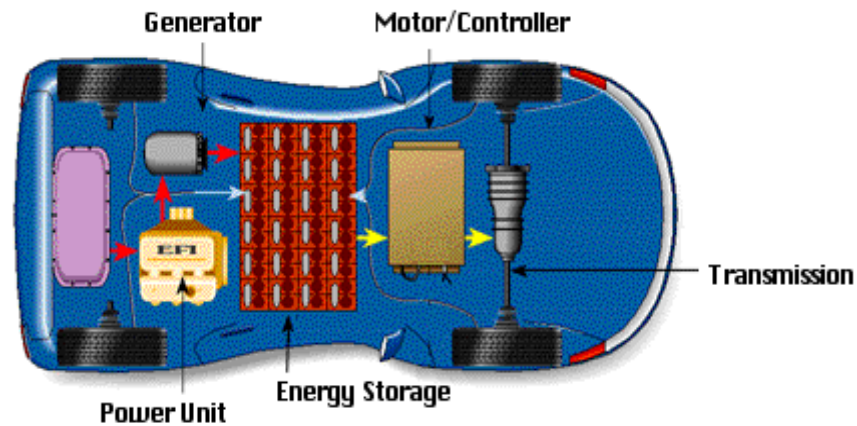
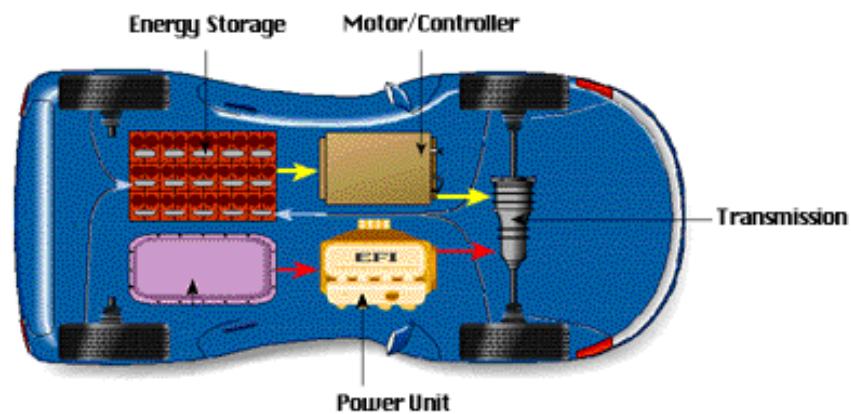


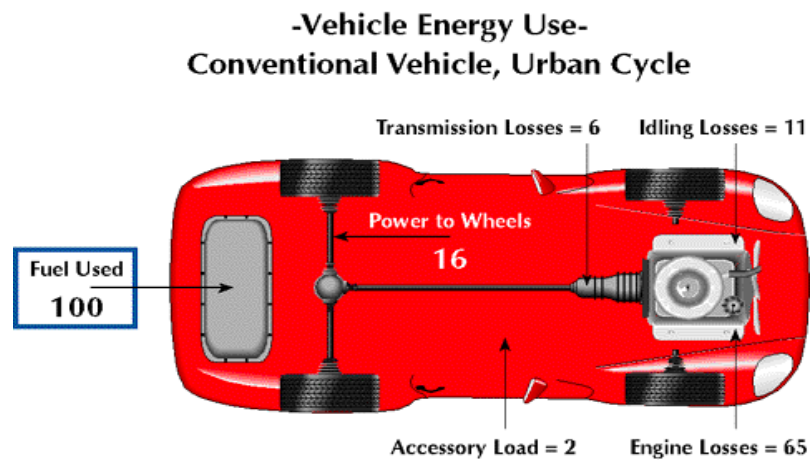
Image of parallel configuration



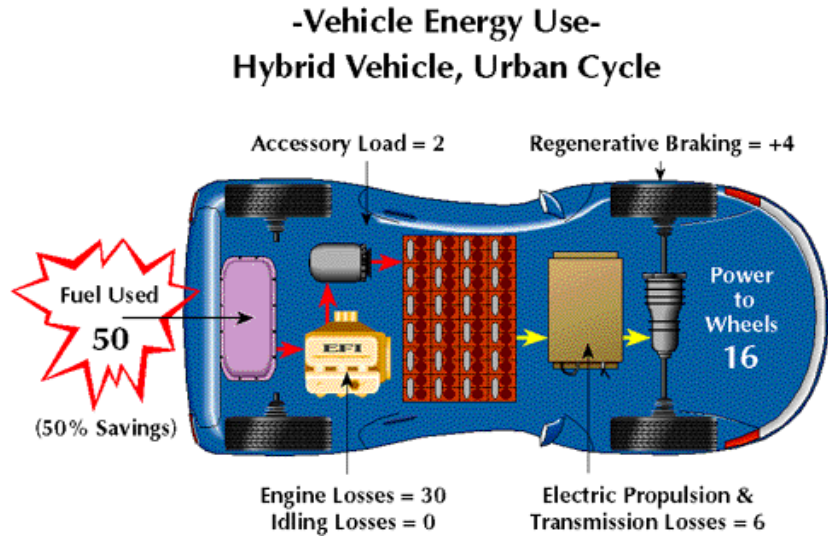
Fig

- In general, European and Japanese HEV development is emphasizing existing or modestly improved technology. The Europeans and Japanese are concentrating on ways of reducing production costs and making HEVs more marketable in the near future.

Energy loss by conventional vehicle



Energy loss by HEV in comparison to a conventional vehicle



Fig

